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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,546	04/22/2004	Robert Malcolm Setbacken	8371/13	7292

757 7590 09/20/2007

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ART UNIT	PAPER NUMBER
2878	

MAIL DATE	DELIVERY MODE
09/20/2007	PAPER

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/829,546
Filing Date: April 22, 2004
Appellant(s): SETBACKEN ET AL.

John. C. Freeman
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4/20/07 appealing from the Office action mailed 11/21/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,803560	**OKUMURA et al.**	**10-2004**
7045775	**LEONG et al.**	**5-2006**
2003/0193016	**CHIN et al.**	**10-2003**
6,727,493	**FRANKLIN et al.**	**4-2004**

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-6, 11-14, 27, 28, 34-38, and 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al. (U.S. 6,803,560) in view of Leong et al. (U.S. 7,045,775).

Regarding claim 1, *Okumura* teaches (Figure 2) a positional encoder assembly comprising a light source (1) to generate an optical signal, an optical element support structure (8) housing a refractive optic (2) to direct the optical signal, a frame defining a cavity, a hollow within which the light source (1) is disposed, and a sensor (6) disposed within the cavity and adapted to generate an electrical signal in response to the optical signal. *Okumura* does not teach

that said optical element support structure defines a protrusion and that the frame has a recess to receive the protrusion. *Leong (Figure 8)* teaches that the lens housing (66) is attached to the sensor housing (60) via a snap feature (74), which includes a protrusion and a recess. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a snap feature in *Okumura*, as taught by *Leong*, to fix the optical element support structure to the frame, provide alignment, as well as provide a release feature if needed for repair or adjustment.

Okumura does not teach that the frame is a lead frame attached to a circuit board assembly such that the sensor is disposed at a predetermined elevation with respect to the circuit board assembly. *Leong (Figures 8 and 9)* teaches a sensor (42) comprising a lead frame (60) that is attached to a circuit board (Figure 3, column 4, lines 47-50) such that the sensor is disposed at a predetermined elevation with respect to the circuit board. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a lead frame attached to a circuit board in *Okumura*, as taught by *Leong*, to facilitate electrical connection to other optoelectronic devices that are also connected to the circuit board.

Regarding claim 27, *Okumura (Figure 2)* teaches a positional encoder assembly comprising a light source (1) to generate an optical signal, a frame, the frame defining a first cavity and a hollow within which the light source (1) is disposed, and a sensor (6) disposed within a second cavity and adapted to generate an electrical signal in response to the optical signal. *Okumura* does not teach that the frame is a lead frame supported upon a circuit board assembly and the corresponding claimed structure of the lead frame. *Leong (Figures 8 and 9)* teach a sensor (82) with a lead frame (60) that is attached to a circuit board (Figure 3, column 4, lines 47-50) and a connector (68) positioned above the circuit board assembly and located

externally to the lead frame. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a lead frame attached to a circuit board with external connectors in *Okumura*, as taught by *Leong*, to facilitate electrical connection to other optoelectronic devices that are also connected to the circuit board.

Okumura as modified by Leong (Leong, Figures 8 and 9) does not teach that the sensor is supported on a lead frame contact. It is known in the art that the sensor must have a contact to be electrically connected to the lead frame. It would have been obvious to one of ordinary skill in the art at the time of the invention to support the sensor with a contact in *Okumura as modified by Leong* to connect the sensor to the lead frame while requiring minimum space.

Okumura as modified by Leong (Leong, column 4, lines 49-53) teaches that the light source and sensor are attached to the lead frame by any suitable connection method, such as wire bonding, but does not teach the particular electrical connection means between the lead frame, circuit board, and sensor. It is known in the art to use connector pads and wire bonding to create efficient electrical connections between optoelectronic devices. It would have been obvious to one of ordinary skill in the art at the time of the invention to use particular connection means in *Okumura as modified by Leong* to provide efficient electrical connections between the light source, sensor, lead frame, and circuit board. Determining the specific electrical connections is based upon the overall electronic circuit of the device.

Okumura as modified by Leong (Leong, Figures 8 and 9) teaches a second cavity and the various electrical connections, but does not teach the height of the cavity with respect to the electrical connections. It is known in the art to have a specific structural arrangement of optoelectronic components based on space constraint, feasibility, and operational efficiency. It

would have been obvious to one of ordinary skill in the art at the time of the invention to use a particular arrangement in *Okumura as modified by Leong*, to optimize the efficiency of the detector and provide a compact system.

Regarding claim 37, *Okumura (Figure 2)* teaches a positional encoder assembly comprising a light source (1) to generate an optical signal, a frame, the frame defining a first cavity within which the light source (1) is disposed, and a sensor (6) disposed within a second cavity and adapted to generate an electrical signal in response to the optical signal. *Okumura* does not teach that the frame is a lead frame supported upon a circuit board assembly and the corresponding claimed structure of the lead frame. *Leong (Figures 8 and 9)* teaches a sensor (82) with a lead frame (60) that is attached to a circuit board (column 4, lines 47-50) and a connector (68) positioned above the circuit board assembly and located externally to the lead frame. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a lead frame attached to a circuit board with external connectors in *Okumura*, as taught by *Leong*, to facilitate electrical connection to other optoelectronic devices that are also connected to the circuit board.

Okumura as modified by Leong (Leong, Figures 8 and 9) does not teach that the sensor is supported on a contact. It is known in the art that the sensor must have a contact to be electrically connected to the lead frame. It would have been obvious to one of ordinary skill in the art at the time of the invention to support the sensor with a contact in *Okumura as modified by Leong* to connect the sensor to the lead frame while requiring minimum space.

Okumura as modified by Leong (Leong, column 4, lines 49-53) teaches that the light source and sensor are attached to the lead frame by any suitable connection method, such as wire

bonding, but does not teach the particular electrical connection means between the lead frame, circuit board, and sensor. It is known in the art to use connector pads and wire bonding to create efficient electrical connections between optoelectronic devices. It would have been obvious to one of ordinary skill in the art at the time of the invention to use particular connection means in *Okumura as modified by Leong* to provide efficient electrical connections between the light source, sensor, lead frame, and circuit board. Determining the specific electrical connections is based upon the overall electronic circuit of the device.

Okumura as modified by Leong (Okumura, Figure 2) teaches first and second cavities, but does not teach that the second cavity lies below the first cavity. It is known in the art to have a specific structural arrangement of optoelectronic components based on space constraint, feasibility, and operational efficiency. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a particular arrangement of the cavities in *Okumura as modified by Leong*, to shield the detector from ambient light that could affect the accuracy of the detection and provide a more compact system.

Regarding claim 3, *Okumura as modified by Leong (Leong, Figure 9)* teaches a lead frame (60), but does not teach a contact disposed beneath the sensor. It is known in the art that the sensor needs to be connected to the lead frame. It would have been obvious to one of ordinary skill in the art at the time of the invention to have a connector beneath the sensor in *Okumura as modified by Leong* to connect the sensor to the lead frame while requiring minimum space.

Regarding claim 4, *Okumura as modified by Leong (Leong, Figure 9)* teaches an external connector (64) protruding from the lead frame (60), the external connector connectable to the circuit board assembly.

Regarding claim 5, *Okumura as modified by Leong (Leong, column 4, lines 49-53)* teaches various connection methods for the die to the lead frame, including wire bonding and any other suitable connection method, but does not teach a connector pad for the external connector. It is known in the art to use connector pads to electrically connect various electrical components. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a connector pad in *Okumura as modified by Leong* to efficiently connect the external connector to other electrical component.

Regarding claim 6, *Okumura as modified by Leong (Leong, column 4, lines 49-53)* teaches a wire bond connectable between the die (62) and the lead frame (60), but does not teach that the sensor is connected to the external connector pad. It is known in the art to use connector pads to electrically connect various electrical components. It would have been obvious to one of ordinary skill in the art at the time of the invention to use wire bonding to connect the sensor to the external connector pad in *Okumura as modified by Leong* to electrically connect the sensor to the lead frame.

Regarding claims 11, 34, and 44, *Okumura as modified by Leong (Okumura, Figure 2)* a lens (2) but does not teach that it is prismatic. It is known in the art to use prismatic lenses in optical detectors. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a particular type of lens (i.e. prismatic) in *Okumura as modified by Leong* based

upon the desired optical characteristics of the device and the particular need for controlling the light.

Regarding claims 12-14, 35, and 45, *Okumura as modified by Leong (Leong, Figures 8 and 9)* teaches that the light source and sensor would have predetermined elevations but does not teach the specific value of the predetermined elevations. It is known in the art to place light emitters and sensors at particular heights based on their respective focusing characteristics and the desired light beam control. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a particular structure arrangement to achieve desired relative predetermined heights in *Okumura as modified by Leong* based on the inherent optical characteristics of the light emitter and sensor and the desired light beam control relative to the target object and the sensor.

Regarding claims 28 and 38, *Okumura (Figure 2)* teaches an optical support structure housing a refractive optic (2) to direct the optical signal, but does not teach that said optical element support structure defines a protrusion and that the frame has a recess to receive the protrusion. *Leong (Figure 8)* teaches that the lens housing (66) is attached to the sensor housing (60) via a snap feature (74), which includes a protrusion and a recess. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a snap feature in *Okumura*, as taught by *Leong*, to fix the optical element support structure to the frame, provide alignment, as well as provide a release feature if needed for repair or adjustment.

Regarding claims 36 and 46, *Okumura as modified by Leong (Leong, column 4, lines 49-53)* teaches that the light source and sensor are attached to the lead frame by any suitable connection method, such as wire bonding, but does not teach the particular electrical connection

means between the lead frame, circuit board, and sensor. It is known in the art that the light source must be electrically connected to the lead frame via some kind of contact. It would have been obvious to one of ordinary skill in the art at the time of the invention to use particular connection means in *Okumura as modified by Leong* to provide efficient electrical connections between the light source, sensor, lead frame, and circuit board.

Claims 7-10, 30-33, 40-43, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura in view of Leong, as applied to claim 1 above, and in further view of Chin et al. (U.S. 2003/0193016).

Regarding claims 7, 30, 40, and 47, *Okumura as modified by Leong (Okumura, Figure 2)* teaches that the cavity is enclosed, but does not specifically teach an encapsulant. *Chin (Figure 8)* teaches an optically transparent encapsulant layer (410) disposed on the sensor (402). It would have been obvious to one of ordinary skill in the art at the time of the invention to use an encapsulant in *Okumura as modified by Leong*, as taught by *Chin*, to isolate the emitter/sensor from harmful external effects and stabilize its operating conditions.

Regarding claims 8, 31, and 41, *Okumura as modified by Leong and Chin (Chin, Figure 8)* teaches that the optically transparent encapsulant layer (410) encapsulates the sensor (402), but does not teach that it encapsulates the wire bonds and connector pads. It is known in the art to encapsulate an entire device, including its electrical connections. It would have been obvious to one of ordinary skill in the art at the time of the invention to encapsulate the connector elements in *Okumura as modified by Leong and Chin* to isolate the emitter/sensor and connector elements from harmful external effects and stabilize its operating conditions.

Regarding claims 9, 32, and 42, *Okumura as modified by Leong and Chin (Chin, Figure 8)* teaches that the optically transparent encapsulant layer (410) is contained within the cavity of the lead frame (407).

Regarding claims 10, 33, and 43, *Okumura as modified by Leong (Okumura, Figure 2)* teaches a code scale (4), but does not teach that it is a disc or that it is disposed between the optical support structure (8) and the lead frame. *Chin (Figure 8)* a code disc disposed between an optical element (404) and the lead frame (407). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a particular scale (i.e. code disc) in a particular location in *Okumura as modified by Leong*, as taught by *Chin*, to detect the angular rotation and position of an object. The position of the code scale relative to the other optical elements depends on the detection technique being used (i.e. reflective or transmissive).

Claims 2, 29, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura in view of Leong, as applied to claims 1, 27, and 37 above, respectively, and in further view of Franklin.

Regarding claims 2, 29, and 39, *Okumura as modified by Leong (Okumura, Figure 2)* teaches a sensor (6), but does not teach an OPTO-ASIC sensor. *Franklin (column 4, lines 61-64)* teaches a position encoder system comprising an OPTO-ASIC sensor on a circuit board. It would have been obvious to one of ordinary skill in the art at the time of the invention to use an OPTO-ASIC sensor in *Okumura as modified by Leong*, as taught by *Franklin*, because they are easy to fabricate. Additionally, one of ordinary skill in the art would have been able to choose a particular sensor based on the detection needs and desired characteristics of the overall device.

(10) Response to Argument

A. Okumura et al. and Leong et al.

1. Claims 1, 3-6, 11-14 and 46

In response to Appellants' arguments (Brief, page 9) that Leong is non-analogous art, the Examiner is not persuaded. First, the field of endeavour is a housing package for an optical sensor. Leong regards a housing structure for an optical sensor. Although Appellants' invention is in an encoder environment, it does not render Leong non-analogous art. Second, in general, housing structures for optical sensors have a plurality of purposes: alignment, stability, protection from external harmful effects, etc. The fact that Appellants have a particular additional goal for the housing structure, however, does not render Leong non-analogous art.

In response to Appellants' arguments (Brief, page 10) that the relevance of combining Leong's snap feature to Okumura is not clear, the Examiner is not persuaded. The Examiner relied on Leong to teach that an optical support structure could be snap-fitted to a housing/frame, not that the optical structure is snap-fitted to a circuit board.

In response to Appellants' arguments (Brief, page 11) that Leong does not teach a lead frame disposed on a circuit board, the Examiner is not persuaded. Absent any further clarification in the claim language, the phrase "disposed on" may be broadly interpreted to mean physically connected and attached to. Leong (Figure 9) shows a sensor housing (42) comprising a lead frame (60, 68). Leong (Figure 3) further teaches that the lead frame (60, 68) is physically connected and attached to a circuit board (52); the lead frame (60, 68) must be physically connected to the circuit board (52) in order to have electrical connections. Thus, the lead frame (60, 68) is disposed on (i.e. attached to) the circuit board (52). Furthermore, even if the lead

frame (60, 68) passes through the circuit board (52), it would still be disposed on (i.e. connected and attached to) an inner portion of the circuit board (52).

In response to Appellants' argument (Brief, page 11) that Leong doesn't teach a sensor disposed at a predetermined elevation with respect to the circuit board assembly, the Examiner is not persuaded. Since Leong teaches a sensor housing (42) with a sensor (62) that is disposed on a circuit board 9 (52), the sensor (62) is at a predetermined elevation.

2. Claims 27, 28, 34-38, 44 and 45

Appellants repeat the same arguments as for claim 1 above. Thus, please refer to the Examiner's response for claim 1 above.

B. Okumura et al., Leong et al., and Chin et al.

Appellants repeat the same arguments as for claim 1 above. Thus, please refer to the Examiner's response for claim 1 above.

C. Okumura et al., Leong et al., and Franklin et al.

Appellants repeat the same arguments as for claim 1 above. Thus, please refer to the Examiner's response for claim 1 above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Davienne Monbleau

Davienne Monbleau

Conferees:

Georgia Epps

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